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En bloc resection for treatment of refractory pre-auricular fistula

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Abstract

Objective: To report a surgical method for the treatment of pre-auricular fistula to lower post-operative recurrence rate.
Methods: Clinical data of 187 patients with pre-auricular fistula who underwent en bloc resection at the Affiliated Hospital of Luzhou Medical College from August 2006 to November 2012 were retrospectively reviewed. Factors that might affect the prognosis following En bloc fistula resection bordered by the superficial temporalis fascia, helix perichondrium and auriculocephalic sulcus were investigated.
Results: Of the 187 patients, 181 achieved primary healing and 6 ended up with delayed healing. During the follow-up period (one to seven years), there were 4 cases of recurrence (2.1%).
Conclusions: Clear demarcation of surgical resection can facilitate easy and thorough resection of preauricular fistula and lead to low recurrence rate. Proper timing and careful search for potential fistula branches are the two crucial factors affecting prognosis.

Keywords: Pre-auricular fistula; Temporalis fascia; Helix perichondrium; Surgery; Infection

1. Introduction

Preauricular fistula resection is a simple routine operation widely practiced in hospitals. However, therapeutic effects of this routine surgery are barely satisfactory, especially in refractory cases with history of repeated infections, pre-auricular abscess, previous surgeries, infectious scars relatively distant from the original fistula opening, or complex fistula structures with multiple openings. Although novel surgical approaches have emerged during all these years of exploration, application of new methods such as microscopic surgery has been limited by their requirements on equipment and operator training. Therefore, searching for a more practical method which provides thorough lesion eradication and can be widely adopted is of great value. The authors performed en bloc fistula resection (bordered by the superficial temporalis fascia, helix perichondrium and auriculocephalic sulcus) in 187 cases of refractory pre-auricular fistula from August 2006 to November 2012, with satisfying outcomes. The cases are reported.

2. Materials and methods

2.1. Clinical data

All procedures reported in this study were approved by the ethics committee of the Affiliated Hospital of Luzhou Medical College. Of the 187 patients (lesion on left in 83 and on right in 104) involved in this study, 78 were male and 109 were female, aging 1–80 years with a median age of 9 years. Duration of recurrent infections were from 20 days to 30 years. Abscess drainage was done in 73 cases, of which 13 encountered recurrence and received subsequent surgical treatments (twice in two cases). Surgeries by the authors were planned after infection was under control, although surgeries

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had to be implemented with infection in 5 patients due to repeated infections that were difficult to control.

2.2. Operative methods

1) For patients with no history of abscess or only limited infection areas, or a fistula close to skin scars: A shuttle shaped incision was made surrounding the fistula opening and scars or just infection scars in the absence of a fistula opening. The subcutaneous tissue was dissected until the superficial layer of temporal fascia and toward the crus of helix (Fig. 1), with care taken to protect helix perichondrium. The dissection proceeded using electrocautery to keep the field clean. The fistula bottom and helix cartilage was separated by sharp dissection and helix perichondrium was removed. Dissection of the posterior aspect (Fig. 2) continued toward the auriculocephalic sulcus with the helix cartilage retracted back, until seeing adipose tissue which was the posterior boundary of excision (Fig. 3). Depth of dissection could reach the superficial parotid gland, although the actual upper and lower dissection boundary was determined by the lesion, while the depth and anterior–posterior border of excision remained constant. Tissues above the superficial layer of temporal fascia and helix perichondrium were resected completely, along with part of the temporal fascia in the direction of auriculocephalic sulcus. The only remaining tissue was the skin covering the auriculocephalic sulcus.
2) For patients with extensive preauricular scars (≥2–3 cm), or an original abscess drainage incision relatively distant from the fistula opening (predictable suture difficulties), a pair of fusiform incisions along preauricular scars and the original fistula opening respectively were made (Fig. 4). Healthy skin between the two incisions was saved so as to reduce suture tension. Subcutaneous tissue beneath the incisions was dissected and removed as one bloc, and the extent of dissection and methods were similar as that described above (Figs. 5 and 6).

The following points were observed: 1) Operations were planned after infection was controlled with normal temperature, no pus from the infection area and no signs of inflammation; 2) the superficial temporal artery and temporalis muscle were carefully protected and bleeding thoroughly controlled when the superficial temporal artery was injured; 3) Operation maneuvers were completed outside the parotid capsule to avoid accidental injuries to the facial nerve or

Fig. 1. Dissection along the superficial layer of temporal fascia toward the crus of helix with electrocautery.

Fig. 2. Dissection toward the posterior aspect of helix cartilage.

Fig. 3. Remaining tissue following fistula resection showing the superficial layer of temporal fascia (red), helix cartilage (black) and subcutaneous tissue beneath the crus of helix (blue).

Fig. 4. Parallel fusiform incisions.

Fig. 5. En bloc dissection of the tissue beneath both incisions.

Fig. 6. Mattress sutures and interrupted sutures of the incisions.

salivary fistula; 4) Certain thickness of skin tissue between incisions was maintained to avoid postoperative necrosis, while attention was paid to eradicate residual fistula tissues.

2.3. Statistical analysis

All data were processed with the SPSS17.0 software using χ^2 (chi-square) test. Using $\alpha = 0.05$ as size of test, $P < 0.05$ was considered statistically significant.

3. Results

Primary wound healing was achieved in 181 cases. Among the six cases with delayed healing, three had post-operative wound redness and swelling, two encountered partial incision rupture, and one experienced complete incision rupture. Follow-up ranged from 1 to 7 years, during which four cases experienced recurrences (2.1%), including two complicated by unidentified secondary fistula openings (one in the external acoustic meatus and the other on the back side of auricular cartilage). Table 1 shows a comparison of recurrence rate among different groups. There was no local hematoma, facial paralysis, salivary fistula or ear malformation as a result of our surgeries.

4. Discussion

The complex branched base of a preauricular fistula often makes complete resection a difficult challenge. However, complete removal of all the branches seems to be the only effective way to prevent recurrence (Zheng et al., 2011). Searching for more practical surgical techniques that can lower post-operative recurrence becomes the key to the successful treatment of preauricular fistula.

Table 1
Comparison of recurrence rates.

Group	No.	Cure	Recurrence	P
Previous abscess drainage				
Yes	73 (100%)	70 (98.3%)	3 (1.7%)	0.331
No	114 (100%)	113 (%)	1 (%)	
First or revision surgeries				
First operation	174 (100%)	171 (98.3%)	3 (1.7%)	0.252
Revision after recurrence	13 (100%)	12 (92.3%)	1 (7.7%)	
Scar size				
<2 cm	89 (100%)	88 (98.9%)	1 (1.1%)	0.683
≥2–3 cm	98 (100%)	95 (96.9%)	3 (3.1%)	

The anatomical basis we use to determine the surgical planes is as follows: Congenital preauricular fistula is formed when the auricular primordium of the first and second branchial arch undergoes incomplete nodule fusion (Huang et al., 2008). From its histological and embryonic origin, we may infer that the fistula base is often generated in the subcutaneous tissue between the superficial layer of temporal fascia and auricular perichondrium. Because there are no crucial nerves or blood vessels in the soft tissue anterior to tragus and helix crus, nor important organs (except arteria temporalis superficialis and auriculotemporal nerve which cause no significant impact on the blood supply and muscle movement of head and face even when ligated or injured), en bloc resection of the fistula base carriss no risk of significant harmful effects on the morphology and function of the local area. In this study, we employed en bloc resection bordered by the superficial temporalis fascia (lower anterior border), helix perichondrium (posterior border) and auriculocephalic sulcus (lower posterior border), containing all soft tissue, auricular perichondrium, fistula branches and surrounding inflammatory tissue and scars above this plane, and preserving only the healthy skin covering the auriculocephalic sulcus. This allows removal of possible fistula branches to the greatest extent. The method we used is similar to that proposed by Prasad et al. (1990) (supra-auricular approach in principle), yet our method has the advantage of expanding the range of operation with no extension of the incision.

Literature review shows that conventional fistula labeling with methylene blue during surgery often leads dissection to the superficial layer of temporal fascia or helix perichondrium, but some fistula branches are incompletely stained and normal surrounding tissue can sometimes be stained by leaked dye, causing confusion between fistula and normal tissue. To better distinguish the fistula, some have come to use the microscope and proposed that microscopic surgery is safe and effective, especially when treating patients with recurrences, repeated infections, abscess cavity and massive scar tissue (Deng and Li, 2007). We believe that in repeated infections, there are certain extents of inflammation in the tissue surrounding the fistula, potentially making distinguishing the fistula challenging, despite the use of microscope. In addition, microsurgery requires extended hospital stay, increased cost and special personnel training, which can restrict its utility in primary care facilities. Recurrence rate in our study was 2.1% (Lam et al., 2001), similar to that of supra-auricular approach and microscopic surgery (1.96%) (Leopardi et al., 2008), and significantly lower than that after traditional methylene blue labeling operations (19–40%). Furthermore, our method avoids the multitude of problems resulting from methylene blue staining and the frustration of identifying minor fistula branches.

Timing of surgery and careful search for less than obvious lesions are two crucial factors in en bloc resection of preauricular fistula. Some researchers recommend surgery

Fig. 7. Secondary opening of fistula in external auditory canal accompanied by abscess formation.

Fig. 8. Secondary opening of fistula behind the auricle.

during infection for they believe this can shorten the course of disease and reduce patient suffering (Xu and Shi, 2012). However, surgery during infection has a number of disadvantages including an inclination of hemorrhage, suture difficulties, skin rupture and high rate of recurrence. In this study, among the five cases undergoing surgeries during infection, only two achieved primary healing and three had delayed healing, with two showing skin swelling and tenderness in the drainage zone who eventually developed recurrence. Hence we propose operation be carried out during non-infectious period. For cases with abscess formation, operation should wait till after abscess drainage and resolution of local inflammation. Moreover, due to the probable existence of more than one fistula openings, searching for openings and obliterating their communications via cartilage are the key to prevent recurrence. Sometimes, secondary openings may appear in external auditory canal, anterior incisura auris, cymba conchalis auriculata, cavity of choncha or triangular fossa. Secondary openings may also canalize through auricular cartilage to communicate with pre-auricular fistula at the rear of the ear. In our study, two of the recurrent cases were found to have secondary openings during the revision surgery, one in external auditory canal (Fig. 7) and one behind the ear (Fig. 8). In our method, the range of dissection is expanded to the subcutaneous tissue beneath auriculocephalic sulcus, so that the helix cartilage can be fully exposed to identify and manage potential fistula openings in the cartilage and residual infectious lesions. This is also a key step to reduce post-operative infection and recurrence.

When treatment outcomes and recurrence rates were compared in consideration of history of abscess formation, previous operations and the extent of infection in this study, results showed no significant differences ($P > 0.05$), suggesting that en bloc resection bordered by the superficial temporalis fascia, helix perichondrium and auriculocephalic sulcus is especially suitable for treating patients with history of repeated infections, pre-auricular abscess, previous surgeries, infectious scars relatively distant from the original fistula opening, infection area greater than 2−3 cm, or complex fistula structures with multiple openings. The foundation of en bloc resection lies in the determination of surgical area (bordered by the superficial temporalis fascia, helix perichondrium and auriculocephalic sulcus) and complete removal of all tissues above the determined surgical plane together with the fistula. As such, there is no need for careful identification of minor fistula branches, greatly simplifying the procedure and making it easily adoptable to surgeons with limited training. In conclusion, the en bloc resection technique introduced in this report is a simple and effective approach for the treatment of congenital pre-auricular fistula.

5. Conflict of interest

The authors declared no conflict of interest.

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